

AMENDMENTS TO THE CLAIMS

1. (previously presented) A metal based material, comprising:
one or more metals having a crystalline grain size of about 1 to about 200 nanometers,
wherein the metal based material has a crystallographic strain of about 0.1 to about 5.0 percent
and is of a high phase purity; and
wherein the metal based material is formed by cavitation.
2. (canceled)
3. (previously presented) The metal based material of claim 1, wherein the cavitation
includes passing a metal containing solution at elevated pressure and at a velocity into a
cavitation chamber, wherein the cavitation chamber creates a controllable cavitation zone to
form a cavitated product.
4. (canceled)
5. (previously presented) The metal based material of claim 3, wherein the metal
containing solution includes a metal salt solution.
6. (previously presented) The metal based material of claim 5 wherein the metal salt
includes one or more of nitrate, acetate, chloride, sulfate, bromide, and mixtures thereof.
7. (previously presented) The metal based material of claim 6 wherein the metal in
the metal containing solution includes one or more of, cobalt, molybdenum, bismuth, lanthanum,
iron, strontium, titanium, silver, gold, lead, platinum, palladium, yttrium, zirconium, calcium,
barium, potassium, chromium, magnesium, copper, zinc, and mixtures thereof.
8. (canceled)
9. (canceled)

10. (canceled)

11. (previously presented) The metal based material of claim 1, wherein the high phase purity includes a purity higher than that of the same metal based material prepared by a classical co-precipitation synthesis.

12. (previously presented) The metal based material of claim 1, including one or more metals having a crystalline grain size of about 1 to about 20 nanometers.

13. (previously presented) The metal based material of claim 1, wherein the metal based material includes one or more of, nanostructured materials, solid state materials, metal supported materials, and catalysts.

14. (previously presented) The metal based material of claim 1, wherein the metal based material comprises one or more of, catalysts, capacitors, piezoelectric materials, titanias, superconductors, electrolytes, ceramic based products, oxides, zeolites, and fine grains of slurries of finely divided reduced metals.

15. (previously presented) The metal based material of claim 1, wherein the one or more metals are deposited on a solid support.

16. (previously presented) The metal based material of claim 1, wherein one or more of, the crystalline grain size, and the crystallographic strain, is capable of being varied based, at least in part, on modification of process conditions of the cavitation.

17. (previously presented) The metal based material of claim 16, wherein the process conditions of the cavitation includes one or more of, varying cavitation bubble size, and varying a length of a cavitation zone.

18. (currently amended) A material formed by cavitation, comprising:
a metal having a crystalline grain size of about 1 to about 20 nanometers, ~~and~~ a phase purity higher than that of a material formed by a classical co-precipitation synthesis and a crystallographic strain of about 0.1 to about 5.0 percent; and
wherein the metal includes one or more of, cobalt, molybdenum, bismuth, lanthanum, iron, strontium, titanium, silver, gold, lead, platinum, palladium, yttrium, zirconium, calcium, barium, potassium, chromium, magnesium, copper, zinc, and mixtures thereof.
19. (currently amended) The material of claim 18, wherein the material has a crystallographic strain of about ~~0.1~~ 0.5 to about ~~5.0~~ 0.7 percent.
20. (previously presented) The material of claim 18, wherein the material is one or more of a, nanostructured catalyst, solid state material, and metal supported catalyst.
21. (previously presented) A metal based material, comprising:
one or more metals having a crystalline grain size of about 0.1 to about 100 nanometers, wherein the metal based material has a crystallographic strain of about 0.1 to about 5.0 percent and is of a phase purity higher than that of a metal based material having the same ingredients and formed by a classical co-precipitation synthesis;
wherein the metal based material includes one or more of, nanostructured materials, solid state materials, metal supported materials, and catalysts; and
wherein at least one of the metals includes one or more of, cobalt, molybdenum, bismuth, lanthanum, iron, strontium, titanium, silver, gold, lead, platinum, palladium, yttrium, zirconium, calcium, barium, potassium, chromium, magnesium, copper, zinc, and mixtures thereof.
22. (previously presented) The metal based material of claim 21, wherein the metal supported materials includes the one or more metals deposited on a solid support, the solid support including one or more of, alumina, silica, titania, zirconia, and alumino-silicates.

23. (previously presented) The metal based material of claim 21, wherein the metal based material includes a silver on alumina catalyst including about 1 to about 15 weight percent silver, wherein the crystalline grain size is less than about 1 nanometer.

24. (previously presented) The metal based material of claim 21, wherein the metal based material includes a copper modified zinc oxide catalyst, where the crystalline grain size is about 5 to about 12 nanometers and the catalyst has a crystallographic strain of about 1 to about 4 percent.

25. (previously presented) The metal based material of claim 21, wherein the metal based material includes a palladium on aluminum-zirconia catalyst, including a palladium component deposited on an alumina/zirconia support, wherein the palladium component has an average crystalline grain size of less than 1 nanometer, and wherein the catalyst is stable at temperatures up to about 1200°C.

26. (previously presented) The metal based material of claim 21, wherein the metal based material includes one or more of a, cobalt molybdate on gamma-alumina catalyst, cobalt molybdate on silica catalyst, bismuth molybdate catalyst, silver on titania catalyst, gold on titania catalyst, and piezoelectric material.

27. (new) The metal based material of claim 1, wherein the metal based material has a crystallographic strain of about 0.5 to about 0.7 percent.

28. (new) The metal based material of claim 21, wherein the metal based material has a crystallographic strain of about 0.5 to about 0.7 percent.